

## ERROR SIGNAL GENERATOR (GENLOCK) GE1M/568

### Introduction

The GE1M/568 forms part of the Natlock system<sup>1</sup> of picture-source synchronisation. It differs from the Error Signal Generator GE1L/532 (which it closely resembles) by providing BBC fast-genlock operation<sup>2</sup> in addition.

The generator compares the sync-pulse timings of mixing point syncs and contribution video. From the comparison (which takes account of the four-field PAL sequence when the contribution video includes colour burst) it produces binary error control signals  $A'$ ,  $R'$ ,  $F'$ . These d.c. error signals:

- are available to control the contribution sync-pulse timing by direct connection or *ICICLE* link;
- are combined in a tone coder with a colour error signal  $C'$  from an associated phase comparator<sup>3</sup> to give control of the contribution signal by control-line connection;
- are processed in a genlock comparator unit<sup>4</sup>; when *Genlock* is selected the unit provides four error signals  $A'_g$ ,  $R'_g$ ,  $F'_g$ ,  $XF'_g$  to control the mixing-

point waveform generator drive unit<sup>4,5</sup> and sync-pulse generator in fast-genlock mode.

The generator also provides a signal whose mark-to-space ratio indicates the timing error between mixing-point and contribution syncs.

The GE1M/568 comprises the following eight A-sized units, listed as accommodated from left to right in a PN3/23 chassis with a PN3A/16H rear-interconnection panel:

PS2/13F	Power Supplier
UN1/589	Sync Separator
UN17/505	Sync Process Unit
UN17/517	PAL Analysis Unit
UN17/506	Comparator Unit
CD2/501	Tone Encoder
UN17/523	Genlock Comparator Unit
UN17/524	Picture Phase Unit

N.B. The UN17/523 requires a chassis extender type CH1A/8 for maintenance; all other units require a CH1A/3 extender.

### General Specification

#### Signal Inputs (can be reduced by 6 dB)

Local mixed syncs	2 V p-p
Local V-axis switch	1 V p-p
PAL subcarrier	1 V p-p
Remote video	standard level colour video signal (colour burst 0.3 V p-p $\pm 6$ dB)
Colour error	$C'$ colour error control signal nominal levels: normal 0 V retard -3 V advance -6 V
Genlock control	-5 V to genlock

#### Input Impedances

Pulses and subcarrier	about 1 kilohm
Video	about 10 kilohms

#### Signal Outputs

Error control signals	$A'$ , $R'$ , $F'$
Natlock tone error signal	single frequency, coded by $A'$ , $R'$ , $F'$ and $C'$
Genlock error control signals	$A'_g$ , $R'_g$ , $F'_g$ , $XF'_g$
Picture-phase squarewave	6 V p-p

#### Output Levels

Error control signals	0 V and -6 V nominal (Table 1 gives tolerances)
Tone error signal	0 dB w.r.t. 1 mW into 600 ohms

#### Power Input

200 to 250 V, 130 mA, a.c.

#### Temperature Range

0°C to 45°C

#### Weight

7.3 kg (16 lb)

**Connectors**

Video and pulses	BNC 50-ohm sockets (two sockets in parallel for each input)
Auxiliary Circuits (colour error, genlock select, picture-phase squarewave)	Painton series 159, 7-pole plug
Error Out (error control signals)	Cannon XLR-5-32 plug
Line Out (tone error signal)	Cannon XLR-3-31 socket
Genlock Control Out (genlock error signals)	Cannon XLR-5-32 plug
Mains	Cannon XLR-LNE-32 socket

TABLE 1

Error Control Signal Tolerances

<i>nominal</i> (V)	<i>actual</i> (V)
0	more +ve than -1.5 V
-6	more -ve than -4.5 V

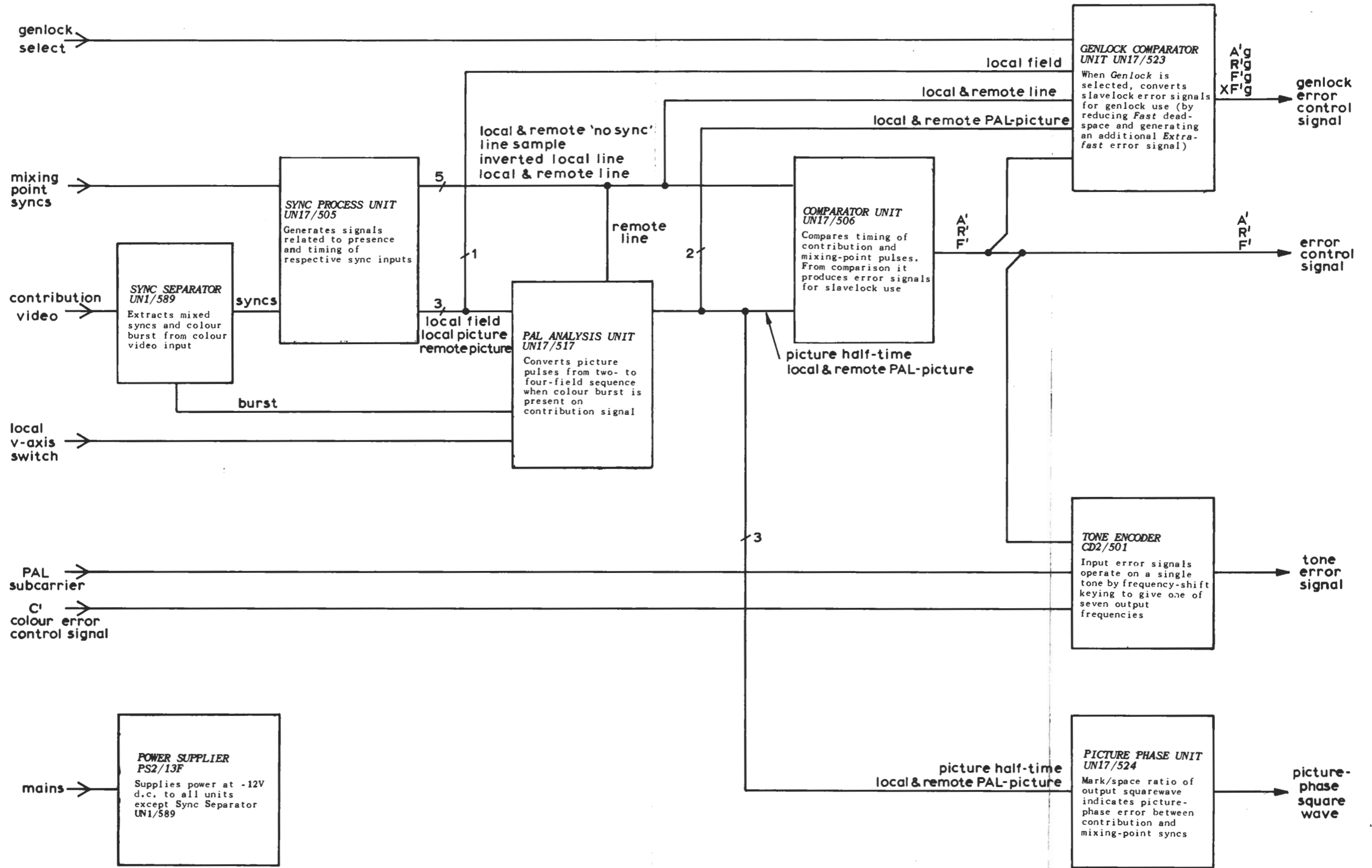


Fig. 1. Error Signal Generator (Genlock) GE1M/568 Functional Block Diagram

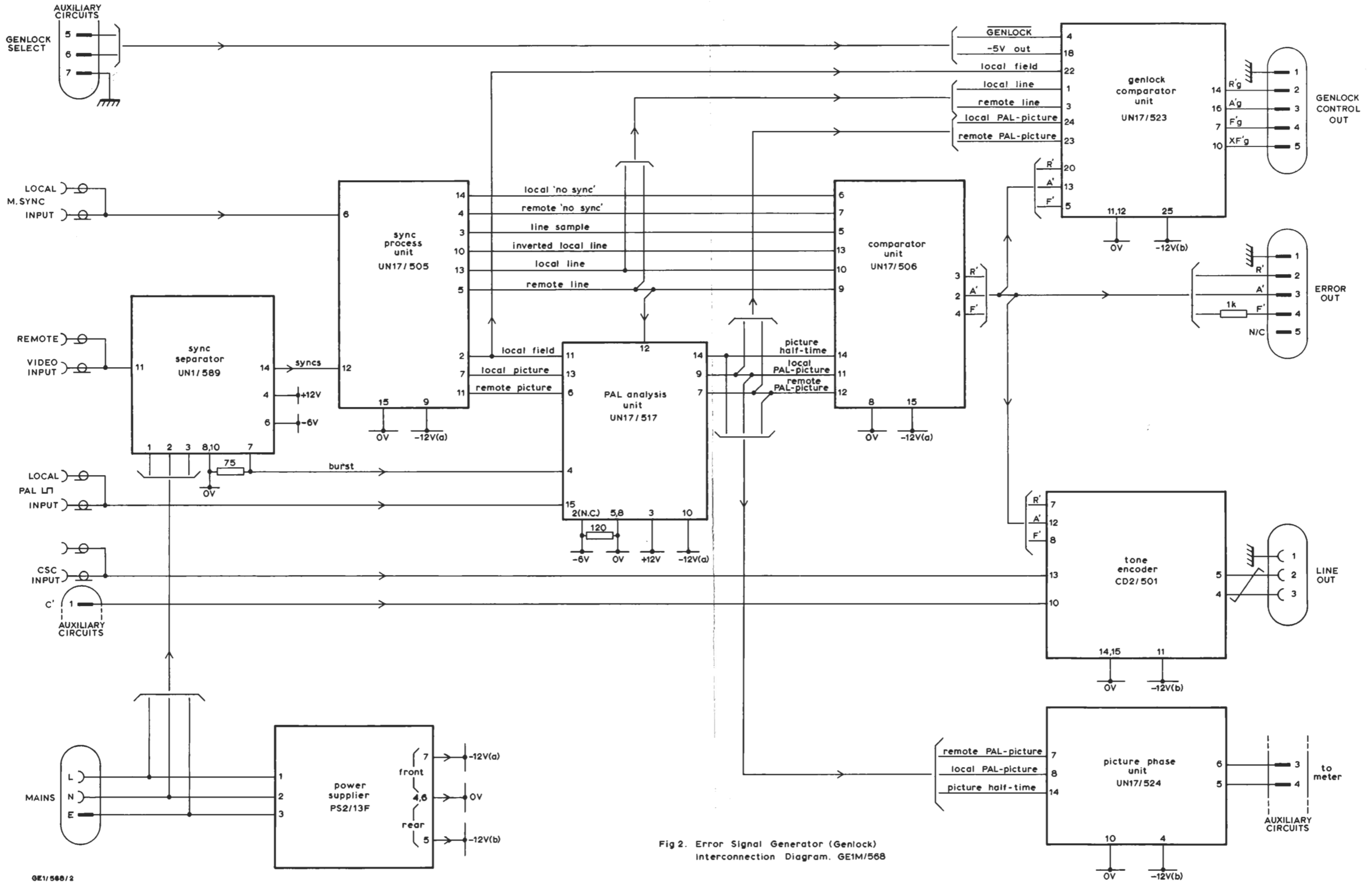


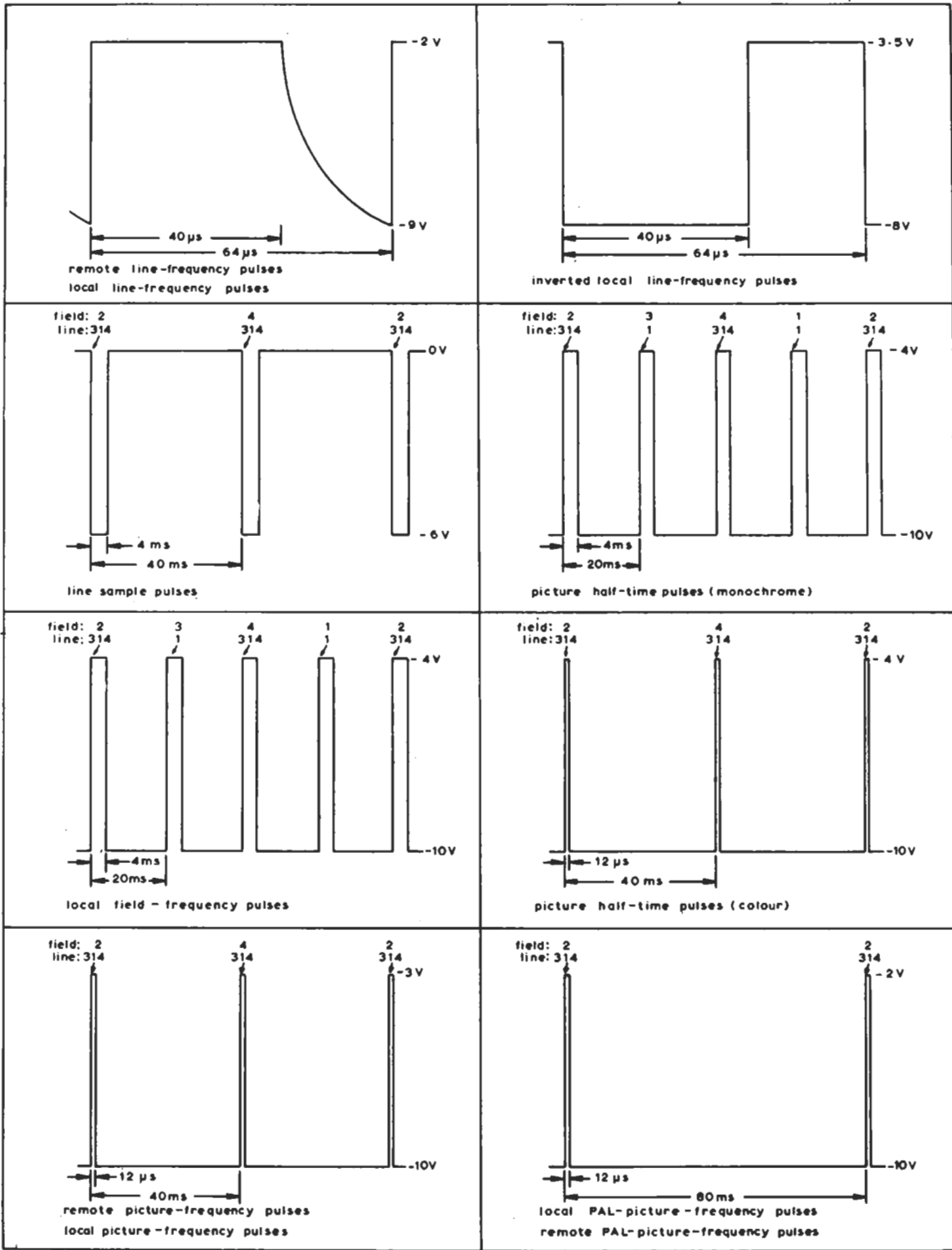
Fig 2. Error Signal Generator (Genlock) Interconnection Diagram. GE1M/568

**System Description**

Operation of the GE1M/568 is as shown in the block diagram Fig. 1; interconnections are shown in Fig. 2. Waveforms relating to some of the inter-unit

signal paths are shown in Fig. 3.

The generator provides output signals for slavelock use as listed in Table 2 and for fast-genlock use as listed in Table 3.



GE1/568/3

Voltages shown are approximate

Fig. 3. Idealised Waveforms in the GE1M/568

Table 2  
OPERATION FOR SLAVELOCK

Error Control Function	Contribution Sync-pulse Timing w.r.t. Mixing Point	Colour Error Input	Error Signal Output (V)			Tone Output (Hz)
			A'	R'	F'	
Fast Retard	Early by more than 12 $\mu$ s	*	0	-6	-6	892
Retard	Early by less than 12 $\mu$ s and more than 50 ns	*	0	-6	0	977
Colour Retard	Less than 50 $\mu$ s	-3	0	0	0	1071
Normal	Less than 50 ns	0	0	0	0	1173
Colour Advance	Less than 50 $\mu$ s	-6	0	0	0	1285
Advance	Late by less than 12 $\mu$ s and more than 50 ns	*	-6	0	0	1407
Fast Advance	Late by more than 12 $\mu$ s	*	-6	0	-6	1542

\* colour error signal immaterial

Table 3  
OPERATION FOR FAST-GENLOCK

Error Control Function	Contribution Sync-pulse Timing w.r.t. Mixing Point	Genlock Error Signals Output (V)			
		A' <sub>g</sub>	R' <sub>g</sub>	F' <sub>g</sub>	XF' <sub>g</sub>
Extrafast Retard	Early by more than 160 $\mu$ s	0	-6	-6	-6
Fast Retard	Early by less than 160 $\mu$ s and more than 400 ns	0	-6	-6	0
Retard	Early by less than 400 ns and more than 50 ns	0	-6	0	0
Normal	Less than 50 ns	0	0	0	0
Advance	Late by more than 50 ns and less than 400 ns	-6	0	0	0
Fast Advance	Late by more than 400 ns and less than 160 $\mu$ s	-6	0	-6	0
Extrafast Advance	Late by more than 160 $\mu$ s	-6	0	-6	-6

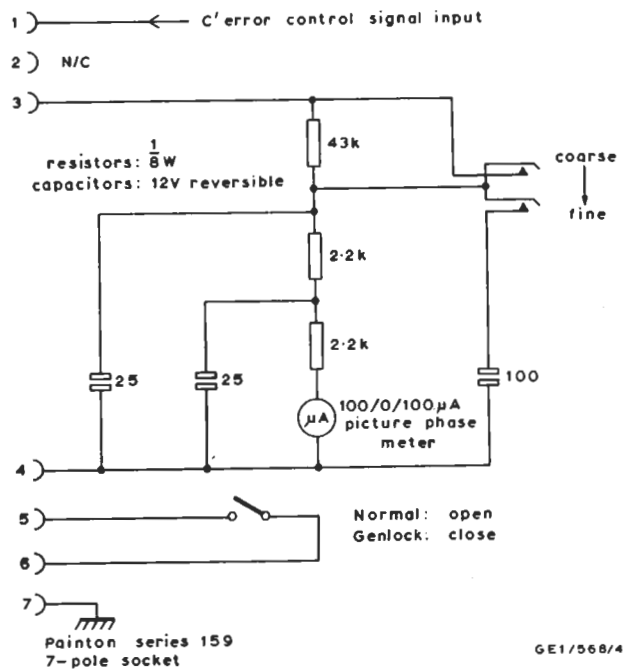


Fig. 4. Auxiliary Circuit connections to GE1M/568

The *Auxiliary Circuits* connector is normally wired as shown in Fig. 4.

**Maintenance**

If a fault in the generator is suspected, check inputs to the rear panel and compare inter-unit waveforms with those shown in Fig. 3. Circuit diagrams of individual units are given in the relevant coded Instructions.

A production test schedule is given in reference 6.

**References**

1. *Picture Source Synchronising*; Instruction P.1
2. *Picture Source Synchronising*; Instruction P.1, Section 4
3. Colour Subcarrier Phase Comparators EP5/505, 6 series
4. Waveform Generator Drive Unit GE1/520A
5. Waveform Generator Drive Unit GE1L/537A
6. Designs Department Specification 10.68(72)

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